The quest for efficiency in thermoelectric nanowires

By Sue Major Holmes

It's all about efficiency in the small world of thermoelectric nanowires. Sandia researchers say better materials and manufacturing techniques for the nanowires could let carmakers harvest power from the wasted heat of exhaust systems or lead to more efficient devices to cool computer chips.

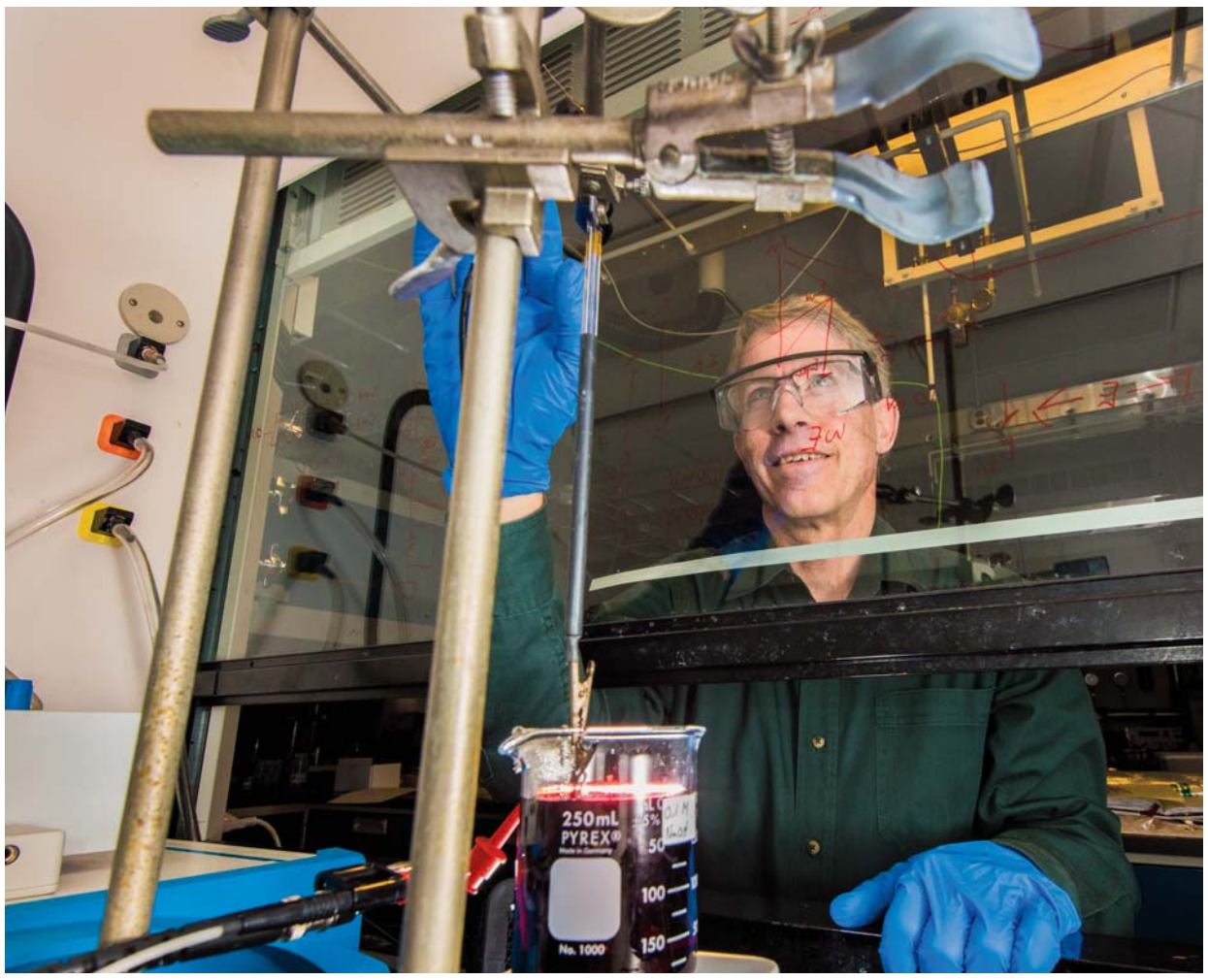
Researchers at Sandia's campuses in New Mexico and California published a paper, "Using Galvanostatic Electroforming of Bi1-xSbx Nanowires to Control Composition, Crystallinity and Orientation," in the Jan. 28 edition of the Materials Research Society's *MRS Bulletin*. The authors are W. Graham Yelton, Steven J. Limmer, Douglas L. Medlin, Michael P. Siegal, Michelle Hekmaty, Jessica L. Lensch-Falk, Kristopher Erickson, and Jamin Pillars.

The work was the first time researchers managed to control crystal orientation, crystal size and alloy uniformity by a single process. All three factors contribute to better thermoelectric performance, Graham says.

"The three together mean a huge gain, and it's hard to do," he says. "It's turning the knobs of the process to get these things to behave."

Better nanowire geometries can reduce heat conductivity and improve what's called the thermoelectric fig-

(Continued on page 4)



Graham Yelton and Sandia colleagues have developed a single electroforming technique that tailors key factors to better thermoelectric performance: crystal orientation, crystal size and alloy uniformity. The work is outlined a paper, "Using Galvanostatic Electroforming of Bi1-xSbx Nanowires to Control Composition, Crystallinity and Orientation," in the Jan. 28 edition of the Materials Research Society's *MRS Bulletin*.

(Photo by Randy Montoya)

Sandia LabNews

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Sandia National Laboratories

Sandia Labs names new vice president of Human Resources and Communications

By Valerie Larkin

A human resources executive with more than 17 years of experience in a wide variety of human resources and communications disciplines is the new vice president of Human Resources and Communications at Sandia.

MELONIE PARKER
(Photo courtesy of Lockheed Martin Corp.)

Melonie Parker will be responsible for shaping Sandia's strategies for staffing, recruiting, communications, health and wellness initiatives, and outreach to the community.

"Melonie's experience across the spectrum of human resources and communications functions, coupled with her strategic leadership approach, will ensure Sandia continues to have the solid foundation it needs to be successful in fulfilling its vital national security mission," said Kim Sawyer, Sandia's deputy laboratories director and executive vice president for Mission Support.

Melonie comes to Sandia from Lockheed Martin Corp., where she served most recently as director of human resources for the Mission Systems and Training Undersea Systems department. She has experience in staffing, compensation, benefits, employee relations, Equal Employment Opportunity, Affirmative Action, diversity programs, and outreach initiatives. She held a number of management positions since joining Lockheed Martin in 1997.

Melonie has a bachelor's in mass communications from Hampton University in Virginia and a master's in human resources development from Villanova University in Pennsylvania. She graduated from Lockheed Martin's Executive Assessment and Development Program in 2012 and is a certified senior professional in human resources.

"I am honored to join an organization that does such outstanding national security work. Sandia has a great reputation, and I look forward to being part of this team," Melonie says.

Inside . . .

DOE launches pilot entrepreneur boot camp. Lab-Corps helps transition lab technologies to the market. See **page 3.**

NNSA, Livermore, Sandia launch education initiative with 13 historically black colleges and universities. See **page 7.**

Jon Madison named winner of a Black Engineer of the Year Award (BEYA) for Most Promising Scientist. Read about Jon on **page 8.**

Interior Department Announces Transmission Line

SunZia Southwest Transmission Project to tap renewable energy sources in Southwest

(Photo by Randy Montoya)

US Secretary of the Interior Sally Jewell joined Assistant Secretary of the Army for Installations, Energy and Environment Katherine Hammack, US Sen. Martin Heinrich, US Rep. Ben Ray Luján, Bureau of Land Management New Mexico Acting State Director Aden Seidlitz, and NNSA Sandia Field Office Manager Geoffrey Beausoleil at Sandia's National Solar Thermal Test Facility Saturday, Jan. 24, to announce a record of decision for the SunZia Southwest Transmission Project. During their visit, hosted by Jill Hruby VP of Energy, Nonproliferation, and High-Consequence Security Div. 6000, officials toured Sandia's solar tower facility and heard briefings about the Labs' falling particle receiver and water research projects, as well as the Tribal Energy Program.

The $2 billion SunZia project is planned to help development of wind and solar energy from New Mexico and Arizona, and provide renewable power to the growing desert Southwest region.

See more event photos by Randy Montoya on **page 5.**

That's that

Consider these items from a couple of editions of the Sandia Daily News: The Radiation Effects and High Energy Density Sciences LDRD team will host an information session Tuesday, Jan. 27 . . . The Bioscience Research Foundation Investment Area (IA) will host an LDRD information session Monday, Jan. 26 . . . Randy Schunk (1911) will present an overview of the FY16 Grand Challenge LDRD Call for Ideas . . . Join Jerry Simmons (1000) for an overview of the FY16 New Ideas and Exploratory Express LDRD Call for Ideas . . . The LDRD Defense Systems & Assessments Information and Intelligence Technologies Investment Area will hold an information session for the FY16 call for ideas . . . The Renewable Systems & Energy Infrastructure Program Area will hold an information session . . . The International, Homeland, and Nuclear Security mission foundation (IHNS) Investment Area will hold an information session for the FY16 LDRD idea call . . . The Computing and Information Sciences Investment Area will host a FY16 Laboratory Directed Research and Development information session . . . Division 1000 VP and Chief Technology Officer Rob Leland will provide an overview of the FY16 Laboratory Directed Research and Development program.

Why am I talking about these sessions? Well, what I've cited here is a nice cross-section of the research opportunities you'll find at Sandia. Of course, the list I've rattled off is by no means exhaustive, not even close, but there's enough here to convey a sense of what an extraordinary place this is.

I'm not a researcher — if I had a chance to do it all again, I might have gone down that road in some capacity — but it seems to me that if I were, I'd see a list like this and feel like a kid in a candy store.

And, remember, this is just about opportunities in our LDRD program. I haven't even begun to talk about the huge variety of R&D opportunities in our eight mission areas. It's very common to hear long-time Sandians say they've had three different careers here. Or five. I've had one, and very grateful for it, but I've often fantasized that if someone could implant calculus II into my brain, I'd go into rocket science. Or bioscience. Astrophysics . . . geophysics. . . . nuclear engineering . . . metallurgy . . . chemistry . . . electrical engineering, computing. And regardless of which path I followed, I could work at Sandia. Extraordinary! The fact that we're doing all this for the benefit of the nation is just the icing on the cake. No sugar water here, folks.

* * *

Heard something the other day that was kind of amusing, maybe because I can see myself in the same situation. It turns out that our computer folks were swamped with requests for help on the first day back following winter break. It seems a couple of hundred people (that's what I heard) had forgotten their computers' Kerberos passwords. It didn't rise to the level of crisis and it all got sorted out eventually, but I think the episode — it's probably replayed every year — suggests that we don't "remember" these things at all. Our fingers, our muscles, do the remembering for us, freeing up our brains to hold more important information — like whether red or green chile is hotter. It's red, right? Green? Uh oh . . .

* * *

When the cool cats — that's us — are away, the mice will play. My team's housed in the IPOC Building, which is apparently in the midst of a mouse invasion. A conscientious resident sent out a building-wide mouse alert, warning us of said rodent incursion, which in turn spawned a flurry of emails in our own group. One colleague said we need to get a cat. Another volunteered her cat to the cause but cautioned us that her feline friend is "catch and release." One wag offered that we should start with a kitten, which we'd bring in as an intern to see if it worked out.

In the meantime, we've been getting regular "mouse reports"; our facility manager is very correctly taking the issue seriously — we might be laughing in our little group but history tells us that New Mexico and rodents don't mix. A pest control business is on site as I write and reportedly has placed traps all over the building.

Oh, by the way, here's the message that started it all: "We just found droppings on someone's desk that sits right across from me. I think they might have been roaming the building while we were on break. Check your drawers."

I checked mine and they were fine.

See you next time.

— Bill Murphy (MS 1468, 505-845-0845, wtmurph@sandia.gov)

ALEGRA code developed by Sandia, collaborators wins outstanding achievement award

By Sue Major Holmes

The National Training and Simulation Association (NTSA) has honored Sandia and collaborating team members for outstanding achievement in developing or applying models and simulations for a highly advanced hydrodynamics code, ALEGRA.

The ALEGRA team from Sandia, the Army Research Laboratory (ARL), and the Project Manager/Armored Brigade Combat Team won the group award for outstanding analysis achievement. The team was honored with one of six awards presented during the annual Interservice/Industry Training, Simulation, and Education Conference in December. The project was chosen from among 48 nominations.

The citation commended the team "for maturating ALEGRA into an invaluable, highly advanced hydrodynamics code for the development of protection technologies. Their efforts have produced sophisticated armor modeling using a multiphysics capability. This capability has been used to develop current armors for Army platforms such as MRAP [Mine Resistant Ambush Protected], Abrams, and Bradley. ALEGRA is also critical to the development of next-generation technologies, including electromagnetic armor."

The effort began 10 years ago to address increasingly sophisticated armor modeling requiring the ability to model solid dynamics and magnetohydrodynamics applications. ARL researchers and Sandia code developers worked for years to determine the relevant physics necessary to fill in large information gaps in material models and algorithms. The team improved the physics within the code, validated the code, and used it to develop improved armor technologies.

Large computational parameter studies, evaluated by partnering teams at various sites, resulted in substantial advances in the understanding of code capabilities, deficiencies, and underlying armor/anti-armor mechanisms. That understanding is crucial to developing improved protection technologies for the military. In addition, the team continually explores the underlying science that ALEGRA must capture to ensure the code continues to mature.

Using ALEGRA, the ARL performs hundreds of virtual experiments every year on advanced armor technologies such as next-generation explosive reactive armor and advanced passive multi-threat armor. This includes simulations that helped guide armor development for critical Army programs such as the ground combat vehicle, MRAP vehicle, Abrams main battle tank, and the Bradley fighting vehicle. Information from the simulations provided insight that cannot be gathered from ballistic experiments alone and shortened the development cycle.

Named on the award from the Sandia team were Erik Strack (1220), John Niederhaus (1446), Duane Labreche (1443), Sharon Petney (1443), and Sue Carroll (9341). Many more team members, spread across five Sandia departments, contributed to the success of the project. Computational Multiphysics Department 1443, under manager Glen Hansen, has primary responsibility for ALEGRA development while supporting multiple applications for DOE and DoD missions.

NTSA, an affiliate of the National Defense Industrial Association, represents companies in the simulation, training, and support services industry. Founded in 1988, it fosters communication between training agencies over requirements, procurement issues, and policies.

Take Note

Heart health month

February is National Heart Month, and Sandia's Environmental Safety & Health team has some tips on how to take better care of your heart:

- Commit to eat more healthfully.
- Commit to get a little more exercise.
- Commit to a health initiative — reduce stress, shed extra pounds, and improve sleep by walking, exercise classes and activities, and Virgin Health Miles events and challenges.

Basic symptoms of a heart attack include chest tightness or pressure and/or pain in the chest, neck, jaw, arms, or back. While heart attacks can occur in both men and women, often the warning signs can look different. According to the National Institute for Health, major symptoms prior to a heart attack can include:

Women:	Men:
• Unusual fatigue	• Shortness of breath
• Sleep disturbance	• Weakness
• Shortness of breath	• Unusual fatigue
• Indigestion	• Cold sweat
• Anxiety	• Dizziness

Never ignore any possible symptoms of a heart attack. If you believe that you are having a heart attack, call 911. A false alarm investigated is better than a heart attack ignored.

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Bill Murphy, Editor **505/845-0845**
Randy Montoya, Photographer **505/844-5605**
Patti Koning, California site contact **925/294-4911**
Michael Lanigan, Production **505/844-2297**

Contributors: Michelle Fleming (Ads, Milepost photos, 844-4902), Neal Singer (845-7078), Patti Koning (925-294-4911), Stephanie Holinka (284-9227), Darrick Hurst (844-8009), Heather Clark (844-3511), Sue Holmes (844-6362), Nancy Salem (844-2739), Tim Deshler 844-2502), Valerie Larkin (284-7879), Valerie Smith, manager (844-6167)

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LOCKHEED MARTIN

DOE launches pilot entrepreneur boot camp

By Holly Larsen

Interest in entrepreneurship is alive and kicking in the Livermore Valley, if attendance at a recent meeting on the topic is any indication. In a Livermore Valley Open Campus room set up for 60, it was standing-room only as staff from Sandia and Lawrence Livermore national labs gathered on Jan. 21, to learn about Lab-Corps, a new DOE-funded "boot camp" on transitioning lab technologies to the market.

The two national labs, the UC Davis Graduate School of Management, and the Livermore-based i-GATE Innovation Hub garnered a highly competitive $350,000 grant from the DOE's Office of Energy Efficiency and Renewable Energy (EERE) to help launch Lab-Corps, now in its pilot year.

"Throughout the national labs, we see an incredible commitment to our national security missions. Now, we're aiming to foster an equally deep commitment to expanding the societal impact of our results. Essentially, the Lab-Corps program will provide the tools the labs need to meet our obligation to be outstanding stewards of taxpayer-funded R&D," said Sandia/California site VP Stephen Rottler in his introduction at the meeting.

Innovation is all about the network needed to bring an idea to reality, said Andrew Hargadon, director of the Child Family Institute for Innovation and Entrepreneurship and a UC Davis professor of technology management, at the Livermore Valley Lab-Corps kick-off. (Photo by Julie Russell, LLNL)

Putting experience to work

A key Lab-Corps strategy is to help the teams learn from the experiences of others. As a first taste of this strategy, meeting attendees listened to a panel of three entrepreneurs who had left the national labs to successfully market new products.

Each of the panelists encountered different ups and downs. For example, former Sandian Don Arnold, who helped found a company that was purchased by leading mass spectrometry supplier AB SCIEX, obtained funding for his venture after only one pitch. Greg Sommer, also a former Sandian, gave at least 150 pitches before finding investors for his point-of-care medical testing company, Sandstone Diagnostics.

Nonetheless, the three stressed several common themes.

"I really began to understand the importance of personal relationships," said Greg. "All of a sudden, life became a contact sport. I realized that people were not judging my idea — they were judging me and my team. Did we have the dedication to pull this off?"

Don agreed and added, "It's really important to be adaptable. After listening to potential customers, you'll probably find that you need to create a very different product than what you'd originally envisioned."

The third panelist, Lloyd Hackel, a former LLNL scientist who helped start the Metal Improvement Co., which was originally funded and then bought by advanced technology supplier Curtiss-Wright, offered this advice: "Do your homework, but don't be afraid of the unknown. You won't have all the answers when you start out — but you have to move forward anyway."

Entrepreneurial insights shared

Two others also spoke. Professor Andrew Hargadon, founder of the UC Davis Child Family Institute for Innovation and Entrepreneurship and author of "How Breakthroughs Happen: The Surprising Truth About How Companies Innovate," stated that innovation isn't about an idea, but rather about the network needed to bring an idea to the market.

Tracing the trajectory of penicillin to illustrate his point, Hargadon noted that several 19th century scientists, among them Lister and Pasteur, had isolated molds and understood their therapeutic benefits before the 1928 "discovery" of penicillin by Sir Alexander Fleming. It wasn't until Howard Florey in the early 1940s built a multi-faceted team with drug manufacturing and other expertise that penicillin came into use as a life-saving drug.

Jim Presley, managing director of Pacific Private Capital who has volunteered his time as a mentor and chair for the Lab-Corps Industrial Advisory Board, introduced attendees to the business canvas. This one-page business plan tool requires research into nine key areas — including value proposition, channels, and customer relations — with the most intense focus on listening to and understanding customers.

Tech transition boot camp

Lab-Corps will provide extensive training and resources to two teams selected competitively in late March 2015 from the Livermore Valley Site pilot program, along with two teams each from four other national labs. The objective of the pilot is to determine if training can enhance researchers' understanding of methods that would allow a wider audience to benefit from government investments in the national labs. If successful, the pilot could be expanded and funded for several years to meet the DOE goal of encouraging lab-wide entrepreneurial skills and bring a greater number of lab technologies to market.

Teams selected for Lab-Corps, will consist of a principal investigator, an entrepreneurial lead, and an industry adviser, and receive $75,000 to attend entrepreneur training and collect direct customer feedback on a potentially marketable technology in an area of interest to EERE.

At the end of 5–7 weeks of intensive training, market research, and networking over the summer, the teams will gain the information and know-how needed to complete and present the business canvas. Experience from the National Science Foundation's I-Corps program — the model for Lab-Corps — suggests that teams will need to talk to about 100 potential customers to complete their business canvas.

In essence, the teams will apply the scientific process to refine and validate their hypotheses — summarized as value propositions — about their product. The teams will gain a keen sense of their product's commercial potential and of the resources and teams needed to transition the product to the market, whether through industry partnerships, licensing agreements, startups, or other business opportunities.

Next Steps

Carrie Burchard of Sandia and Christine Hartmann of LLNL outlined steps for staff wishing to join the competition — or simply learn more about entrepreneurship.

Lab employees are invited to attend two free training programs: a series of weekly entrepreneur information sessions at the I-GATE Innovation Hub in downtown Livermore on Wednesdays at 4 p.m. and UC Davis entrepreneur training sessions held Thursday evenings. To sign up, members of the workforce can go to http://tiny.sandia.gov/Entrepreneurs and submit a request. Lab staff members who want to compete to be selected as a Lab-Corps team should contact Craig Smith (casmith@sandia.gov) to learn more.

Sandia CaliforniaNews

nanowires

(Continued from page 1)

ure of merit, a measure of a material's electrical and thermal conductivity. The higher the electrical conductivity and the lower the thermal conductivity, the higher the figure of merit and, therefore, the more efficient the material. However, the quality of thermoelectric nanowires in the past proved inadequate.

Thermoelectric nanowire use in its infancy

Despite their inefficiency, some thermoelectric materials are already in use. Graham compares their stage of development to the early days of solar photovoltaic cells: Everyone saw the potential, but they were so inefficient they were used only when nothing else worked.

Improved efficiency in nanowires would increase the use of thermoelectric materials. Graham says they're already used in some sensors, and vehicle manufacturers are looking at their potential to harvest heat from exhaust systems to power vehicle sensor systems. Decreasing the power needed to run a vehicle's operating system could reduce battery and alternator weight and perhaps eliminate some power-generating equipment, trimming vehicle size and weight.

Sandia's paper describes how the team created thermoelectric nanowire arrays with uniform composition along the length of the nanowire and across the spread of the nanowire array, which potentially can include hundreds of millions of nanowires. In addition, they created nanowire crystals of uniform size and orientation, or direction. Uniform composition improves efficiency, while orientation is important so electrons, the carriers of energy, flow better.

The team used a cost-effective method called room-temperature electroforming, which is widespread in commercial electroplating. Electroforming deposits the material at a constant rate, which in turn allows nanowires to grow at a steady rate. The method produced wires 70-75 nanometers in diameter and many microns long.

Graham used pulses of controlled current to deposit the thermoelectric material to control composition throughout the wire and the array. "There are little nuances in the technique that I do to allow the orientation, the crystal growth, and the composition to be maintained within a fairly tight range," he says.

Technique allows control over important facets of nanowire formation

The method produced a fairly large, slightly twisted crystalline wire structure that was almost a single crystal and had the desired orientation. "Without that you couldn't get good efficiencies," Graham says.

The chemistry of the material also is important because antimony salts play a major role in crystalline quality and orientation.

Bismuth-antimony (Bi-Sb) alloys have some of the highest thermoelectric performance — acting both as a conductor of electricity and an insulator against heat — among many materials for near-room temperature applications. But existing Bi-Sb materials don't produce effective solid-state cooling when power is constantly delivered to the device being cooled, such as a computer.

Sandia's team wanted a compound that behaved like a metal but would not conduct heat. Alloying antimony with bismuth fit the bill, Graham says. Bi-Sb nanowire arrays electroformed with an antimony-iodide-based chemistry lacked the needed qualities, but arrays electroformed from an antimony-chloride-based chemistry produced crystallography and orientation for maximum thermoelectric performance.

"The chemistry allowed us to go from poly-nanocrystalline structure to near single crystals of 2-5 micrometers," giving better control over uniformity, Graham says.

The next step is more challenging: making an electrical contact and studying the resulting thermoelectric behavior.

"Thermoelectric materials readily form oxides or intermetallics, leading to poor contact connections or higher electrical contact resistance. That reduces the gains achieved in the materials development," Graham says.

While the Sandia team has been able to get good contact at the bottom of an array, making a connection at the top has proved difficult, he says.

"To make a contact and measure array performance is not trivial," Graham says.

He and his colleagues are seeking further funding to solve the problem of successfully making contacts, and then to characterize the thermal electric properties of arrays. "If successful at the Labs, we would try to find an industry collaborator to mature the idea," he says.

Looking back . . .

Red Storm supercomputer broke ground on many fronts

By Neal Singer

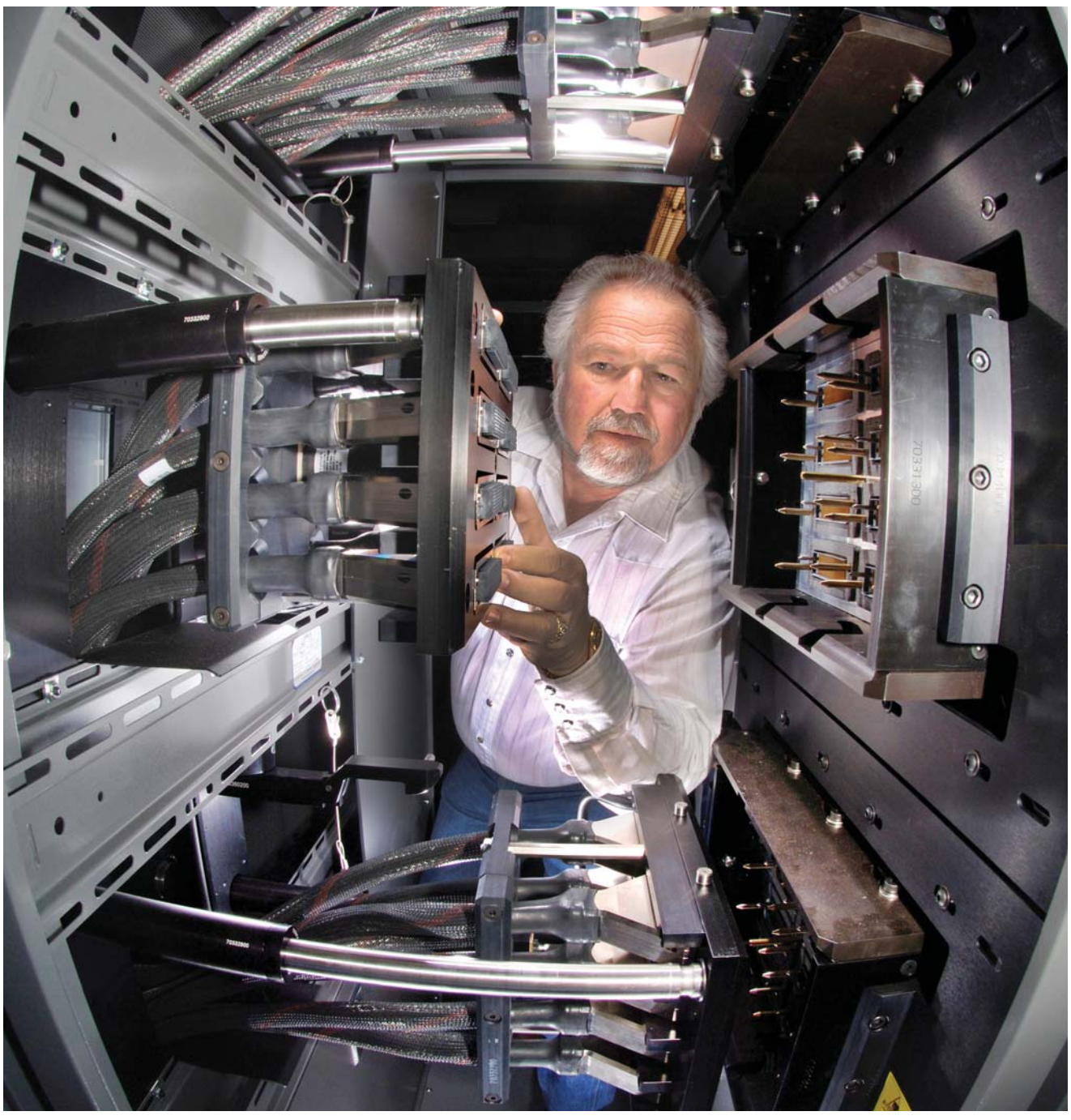
Red Storm was one of the most influential machines of its era. The Sandia-designed, Cray-built supercomputer left 124 descendants at 70 sites worldwide when it was turned off for good in mid-2012.

Red Storm broke new ground. It used off-the-shelf parts that made it cheaper to build, repair, and upgrade. It was air-cooled instead of water-cooled so replacements and upgrades could be done while the machine was running. A custom-designed interconnect chip, operating system, and software made the supercomputer remarkably efficient.

It was developed at Cray Inc. over 20 months instead of the usual five years. Sandia scientists traveled regularly to the company's Seattle, Wash., headquarters. From a peak speed of 41 teraflops in 2005, Red Storm was upgraded to 124 teraflops in 2006 and 284 teraflops in 2008.

Red Storm made possible innovative, highly sophisticated computer simulations to ensure the safety, security, and reliability of the nuclear weapons stockpile. In 2008, a government satellite traveling more than 17,000 mph 153 miles above the Earth slipped out of orbit. The White House called, and Sandia used Red Storm full time for months to predict the outcome of complex destruction scenarios to help the USS Lake Erie safely shoot down the satellite with a rocket.

Cray CEO Pete Ungaro pays the supercomputer a huge compliment: "Virtually everything we do at Cray . . . comes from Red Storm."



COMPUTER SCIENTIST Archie Gibson works inside the Red Storm supercomputer, an award-winning partnership between Cray Inc. and Sandia.

(Photo by Randy Montoya)

US Secretary of the Interior Sally Jewell joined Assistant Secretary of the Army for Installations, Energy and Environment Katherine Hammack, US Sen. Martin Heinrich, US Rep. Ben Ray Luján, Bureau of Land Management New Mexico Acting State Director Aden Seidlitz, and NNSA Sandia Field Office Manager Geoffery Beausoleil at Sandia's National Solar Thermal Test Facility Saturday, Jan. 24, announcing a milestone in the SunZia Southwest Transmission Project.

Photos by Randy Montoya

Mileposts

New Mexico *photos by Michelle Fleming*

Ed Garavaglia
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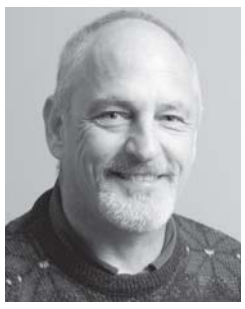

Ron Kulju
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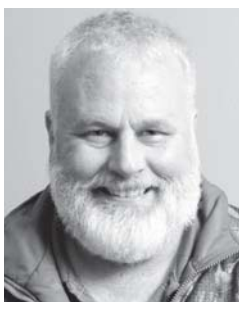

Jeff Zirzow
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Randy Harrison
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Arnel Oczon
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David Outka
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Stuart Van Deusen
30 1111

Bob Huelskamp
25 5750

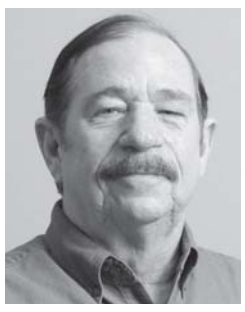
Adam Slavin
25 1531

Larry Young
25 5422

Norbert Tencza
20 4022

Stephanie Willis
20 6533

Tony Bertram
15 2718



Gordon Box
15 2625

Miquelita Carrion
15 2136

Jean-Paul Davis
15 1646

Dale Huber
15 1132

Sue Brandt Johnson
15 10659

Jason Sempsrott
15 5433

Tricia Sena
15 853

Isaac Toledo
15 5528

Retiree

Retiring and not seen in the Lab News pictures: Greta Kathy Congable (754), 20 years.

Recent Retirees

Erskine Burns
38 2521

T.J. (Thomas) Garner
35 2524

Cal Jaeger
34 6833

Pamela Harris
32 6923

Matthew Sena
32 5345

Barbara Boyle
31 750

Roger Hill
31 6112

Scoti Hagerman
25 2155

John Desko
16 2735

Peggy Desko
25 6800

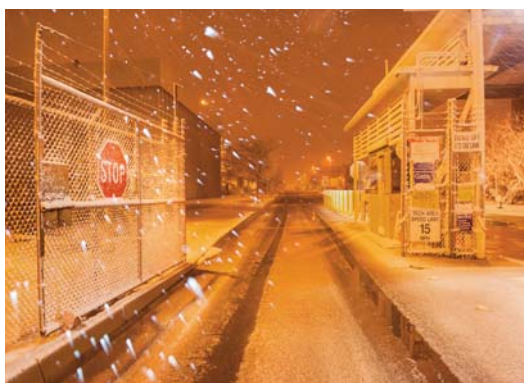
Laura Lenberg
25 9324

Mike Cahoon
21 9310

Sid Gutierrez
20 4100

Doretha Smith
13 10653

Inclement weather information



When winter weather strikes, do you know where to go for information about Sandia work delays or closures?

Should overnight weather conditions make the Labs' parking lots unsafe until they are cleared, Sandia's Emergency Operations Center (EOC) will distribute a workforce message about the delay, including a specific time to report to work, and other relevant details including how to charge time for the delay.

Under typical snowy conditions, messages will be sent no later than 5 a.m. the day of the delay, and will include a stipulated start time dependent on the severity of the storm.

Messages will be delivered in a variety of ways, beginning with Sandia email, allowing employees to monitor the information sources most convenient to them. These sources include:

- Sandia email
- Sandia Bulletin Board (Dial 845-6789 and follow the menu choices; 925-294-3333 for California-specific events.)
- Radio Sandia, 1640 AM
- Alert banners on Sandia's external homepage, www.sandia.gov, and internal Sandia Techweb
- News coverage through local television and radio stations
- Sandia Facebook, facebook.com/SandiaLabs, and
- Sandia Twitter, twitter.com/SandiaLabs

During inclement weather, employees should follow arrangements made with their manager for weather delays, including any telecommuting work. Information regarding road conditions can be found at www.nmroads.com/ in New Mexico, or http://511.org in California.

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MISCELLANEOUS

ALL-IN-ONE PRINTER/SCANNER/COPIER/FAX, Lexmark Pro705, like new, needs new ink cartridges, $75. Babb, 228-5225.

DEER HUNTS, bow, on 320-acre private ranch, unit 5A, 4 authorizations available for Sept. 1-24, $450 ea. Sandoval, 269-6650.

HDTV, Samsung, 40-in., w/Sony DVD player, $200. Hennessey, 505-269-6243.

REFRIGERATOR, Kenmore, black, bottom freezer, French doors, water/ice in door, 25-cu. ft., 35-3/4"W x 34-1/4"D x 69-3/4"H, excellent condition, $1,100. Drebing, 350-6341.

FURNITURE, loveseat & chair; swivel chair; 4-pc. cherry bdr. set; coffee & end tables. Felix, 573-0595.

DINING ROOM TABLE, oak, 6'11" x 3'8", 6 chairs, hidden drawers/cabinets, can email photos, $800. Stavros, 296-2876.

KID'S BDR. SET, Ashley Doll House loft, 2 twin beds, low dresser & mirror, desk, $600. Hall, 867-8829.

GOLF CLUBS, Ping G10, graphite shaft, irons 4-W, $175; Ping ISI-K, steel shaft, 4-W, $125. Lifke, 382-9448.

MATCHING RECLINERS, 2, oversized chair & a half, tan, excellent condition, $200 ea. or $350/both. Adams, 821-0899.

RELOADING PRESS, Ponsness Warren 950 Elite, w/dies for 410, 12 & 20 gauge, $400. Robertson, 407-4808.

CLASSICAL GUITAR, Yamaha, M# CG-40 MA, w/hard case, $100. Flores, 610-1474.

NATURAL GAS GRILL, Weber Genesis Silver-B, $40; over-the-range microwave, Sharp R1610, black, $35. Weagley, 385-4059.

AB COASTER PS500, abdominal/core trainer, like new, $100. Hall, 280-4344.

HAY, rain damaged, good for garden compost & mulch, $3.50/bale, 5 bale min., located in Peralta. Greenwood, 869-0153.

BABY BOUNCER, Baby Einstein, clean, MSRP $100, asking $50; Graco swing, neutral color, MSRP $120, asking $60. Evans, 505-559-0556.

BDR. SET, queen, Southwestern, $2,200; 16,000-lb. Reese 5th wheel hitch, $375; ask for photos. Sandoval, 505-450-1514, text only.

CONSOLE PIANO, Baldwin 660 Classic, mahogany, excellent condition, $1,750 OBO. Thomas, 883-9340.

HE ELECTRIC DRYER, Maytag Bravos XL, 7.3- cu. ft., model MEDB980BW, 4 mos. old, $800. Smith, 505-256-0562.

SPEAKERS, 4, Nova 8B 7KHZ, 80 HMS, Radio Shack TC Pioneer, $15 ea. Fenimore, 298-8052.

SAMSUNG GALAXY TAB PRO, 12.2-in., 32 GB, WiFi only, like new, $300. Bobbe, 505-350-9544.

MULTI-FAMILY YARD SALE, Feb. 5-7, antiques, vintage jewelry, designer clothes & purses, household, many misc., 2517 Wisconsin. Langwell, 299-1024.

MUZZLELOADER, Knight MK94, .50 caliber inline, case, scope, bi-pod, sling & cleaning rod, $350. Plumb, 681-1846.

TRANSPORTATION

'15 FIAT 500, w/sport pkg., ran w/wrong year in 1/23 Lab News, ~1,000 miles, brand new, perfect condition, premium sound system, $14,500. Martin, 623-687-7673.

'14 FORD FOCUS LEASE TAKEOVER, lease ends May 2016, contract mileage 21,055, current mileage 6.6K, $149/mo. McGrath, 505-980-0991.

How to submit classified ads

DEADLINE: Friday noon before week of publication unless changed by holiday. Submit by one of these methods:

- **EMAIL: Michelle Fleming (classads@sandia.gov)**
- **FAX: 844-0645**
- **MAIL: MS 1468 (Dept. 3651)**
- **INTERNAL WEB: On internal web homepage, click on News Center, then on *Lab News* link, and then on the very top of *Lab News* homepage "Submit a Classified Ad." If you have questions, call Michelle at 844-4902. Because of space constraints, ads will be printed on a first-come basis.**

Ad rules

1. Limit 18 words, including last name and home phone (If you include a web or e-mail address, it will count as two or three words, depending on length of the address.)
2. Include organization and full name with the ad submission.
3. Submit ad in writing. No phone-ins.
4. Type or print ad legibly; use accepted abbreviations.
5. One ad per issue.
6. We will not run the same ad more than twice.
7. No "for rent" ads except for employees on temporary assignment.
8. No commercial ads.
9. For active Sandia members of the workforce, retired Sandians, and DOE employees.
10. Housing listed for sale is available without regard to race, creed, color, or national origin.
11. Work Wanted ads limited to student-aged children of employees.
12. We reserve the right not to publish any ad that may be considered offensive or in bad taste.

'06 SUBARU TRIBECA LIMITED, 7 passengers, navigation, new tires & brakes, very good condition, 109K miles, $10,000. Retunski, 505-480-2865.

'03 FORD EXCURSION XLT, V10, 4WD, silver, $2,800 of recent documented upgrades, 159K miles, $7,600 OBO. Fugate, 505-750-0176.

'98 BUICK LESABRE, 6-cyl, re-built engine, new tires, $2,000 OBO. Vandevender, 505-332-8824, ask for Randy or Nolan.

'06 GMC SIERRA 1500, extended cab, 2WD, work truck, V8, white/gray, locking bed toolbox, receiver hitch, chains, $6,900 OBO. Suo-Anttila, 275-8373.

'06 GMC ENVOY SUV, 6-cyl., 109K miles, runs great, well maintained, $4,800. Salazar, 319-7250.

'99 RAM 1500, 4WD, club cab, 5.2L, manual, lifted, off-road tires, 117K miles, runs great, $3,500. Flynn, 815-762-4075.

'06 MAZDA MIATA, 30K miles, excellent condition, $10,000. Melkey, 319-538-6152.

'01 TOYOTA SIENNA XLE VAN, white, beige interior, smoke free, captain's chairs, 1 owner, 166K miles, $4,800, Hebert, 505-385-5010.

'06 JEEP WRANGLER UNLIMITED, 4x4, lifted, AT, 4.0L, AC, hardtop, softtop, winch, built, 96K miles, $16,500. Bonahoom, 505-298-6296.

'93 CLASSIC JAGUAR VANDEN PLAS, newly painted, extras, $5,000. Garcia, 280-5815, ask for Frank.

RECREATION

'05 HARLEY-DAVIDSON ROAD KING, new battery & tires, garaged, 37K miles, $11,500. Lederer, 238-8056.

ROAD BIKES, Trek Pilot, 55-cm, $650; Jamis Comet, 54-cm, $500; Al frames/carbon forks, gatorskins. Miller, 238-4534.

'08 YAMAHA V-STAR SILVERADO, 650cc, gray, excellent condition, 1621 actual miles, hardly ridden, $4,200. Shelton, 379-1006.

'11 KTM ADVENTURE 990 DAKAR MOTORCYCLE, Saddleman gel seat, KTM tank bag, 19K miles, like new. Scott, 505-450-1778.

REAL ESTATE

3.12 ACRES, Tijeras, ~#116 Rincon Loop, very quiet, excellent access to I-40, $23,500. Swahlan, 401-0031.

4-BDR. HOME, 3 baths, 4,280-sq. ft., separate in-law quarters, swimming pool, $419,900, $429,900 w/realtor. Ramos, 972-951-0290.

3-BDR. HOME, 2-1/2 baths, 1,410-sq. ft., all appliances, stair elevator, MLS#818070, $144,000. Wright, 505-332-0773.

3-BDR. HOME, 1-3/4 baths, 1,400-sq. ft. w/400-sq. ft. studio (3/4 baths), Ridgecrest SE, close to Sandia, $250,000. McGrath, 480-4545.

WANTED

ROOMMATE, UNM/Ridgecrest, 2-bdr. home, 1 bath, garage, bike ride to UNM, $375/mo. Kelly, 263-0810.

GOOD HOME, birds, female canary, 2 society finches, w/large cage, happy, healthy birds. Schauer, 503-5051.

BICYCLE, for short commutes, I'm 5'6". Biedermann, 554-7468.

BOOKS, for school in Zimbabwe, preschool-7th grade. Hollis, 505-274-8306.

ROOMMATES, 2 available rooms, home 15 mins. from KAFB, students preferred, $350 mo./split utilities. Wood, 505-270-8490.

NNSA, Livermore, Sandia launch education initiative with 13 historically black colleges and universities

Department of Energy will provide a $25 million grant over the next five years to support cybersecurity education

President and Laboratories Director Paul Hommert took part in a roundtable discussion on educating future cybersecurity experts with Vice President Joe Biden and others at Norfolk State University in Virginia on Jan. 15. Biden and Energy Secretary Ernest Moniz used the occasion to announce $25 million in DOE grants over five years for cybersecurity education, known as the Cybersecurity Workforce Pipeline Consortium, and funded under NNSA's Minority Serving Institutions Partnerships Program (MSIPP). The grants will help fill the growing demand for cybersecurity jobs and help expand science, technology, engineering and math curricula at the 13 historically black colleges and universities (HBCU) who are part of the consortium, along with Sandia and Lawrence Livermore national labs and the Charleston County (SC) School District.

Paul talked about Sandia's educational outreach, longstanding collaboration with HBCUs and the Labs' efforts to recruit and boost education in cybersecurity, including Sandia's hosting in 2013 of seven student interns from Norfolk State, the lead institution for the grant. In this photo provided by the Vice President's office, Paul stands fourth from the right between Norfolk State Interim President and CEO Eddie Moore Jr. and Secretary Moniz. White House Science Advisor John Holdren is second from left.

The cybersecurity consortium will strengthen institutional research in DOE and NNSA mission areas and increase faculty participation in activities such as collaborative research, technical workshops, expert panel reviews and studies, and competitive processes, as well as drawing DOE scientists and engineers into curriculum development, teaching, mentoring and research.

The 13 HBCUs will receive the first allocation of the $25 million DOE grant in FY15.

Best man

BEYA award winner listened to his parents and excelled in materials science

By Nancy Salem

Jon Madison (1814) says a key to his academic and professional success was listening to the adults in his life. "I don't pretend to know everything," he says. "I listened to the people who had my best interests at heart: my parents, my teachers, my mentors. I might not have understood or agreed with them, but just hearing what they were telling me provided opportunities later in life."
(Photo by Randy Montoya)

Growing up in Kansas, Jon Madison had a strong sense of who he was and where he was going. "I wasn't an average kid," he says. "Whatever my peers were doing, chances are I wasn't doing it. After school and weekends I helped with my family's business. When it came to performing academically and taking an intellectual route, I always went my own way."

Jon (1814) followed a path to advanced degrees in mechanical engineering and materials science and a career at Sandia. He mentors interns at the Labs and young people in the community.

He recently was named winner of a Black Engineer of the Year Award (BEYA) for Most Promising Scientist. "This is a high point in my career," Jon says. "I was excited to win and to represent Sandia in this way."

BEYA is a program of the national Career Communications Group, an advocate for corporate diversity, and is part of its STEM achievement program. The awards annually recognize the nation's best and brightest engineers, scientists, and technology experts. Jon will receive his award at the 29th BEYA conference Feb. 5-7 in Washington, D.C. The event precedes National Engineers Week.

Aimed for a career in science

Jon's parents were painting contractors who encouraged him to excel. "They didn't push me into any one field or direction," he says. "They said whatever you do, do your best, and that stuck with me."

He worked in the family business and decided it wasn't for him. He wanted a career in science. But math didn't come easy, so his sister tutored him every day throughout his first few years of high school. "She got me on the path to learning and understanding math," he says.

Jon went to Clark Atlanta University, a historically black university, where he earned a bachelor's degree in engineering science. He then headed to the University of Michigan to complete his master's and PhD in materials science and engineering.

Jon was in the Louis Stokes Alliance for Minority Participation (AMP) initiative, a STEM scholarship program of the National Science Foundation. "They said from day one that I would go to grad school," he says. "The expectations were high."

He did summer internships at the Naval Research Laboratory in Washington, D.C., Washington State University, and the Massachusetts Institute of Technology. "I was looking for mechanical engineering internships but ended up in materials research programs," he says. "I got a lot of exposure and opportunity to see materials science in different ways. That's when it clicked for me I would like to pursue materials science as a career."

Jon began looking at the job market as he finished his dissertation, focusing on industry rather than academia. A conversation with his mentor, George Spanos, technical director of the Minerals, Metals & Materials Society (TMS), changed all that. Jon recalls Spanos asking him what was most important to him. What were the things he really, really wanted to do in his career? "I boiled it down to three things. I wanted to mentor students, do fundamental research, and be involved in professional societies," Jon says. "George responded by saying it sounded like I was looking for a national lab. That had never even entered my mind."

That was the summer of 2009, and in 2010 Jon joined Sandia. "I talked to many of the labs, but Sandia was always the frontrunner," he says.

An advocate for diversity

Jon's work centers on destructive and non-destructive techniques to understand microstructure in three dimensions, and using that information in experiments and simulations. He's also helping to develop a materials database that can be used across the Labs. "I get a tremendous sense of satisfaction from accomplishing things," he says. "I like to see something come together in a complete way."

Duane Dimos, director of Pulsed Power Sciences Center 1600, nominated Jon for the BEYA award, saying his research skills "are differentiated from many peers by a mastery of both experimental and modeling expertise with a focus on quantification of defects in materials microstructures."

"Jon is a tireless advocate for ensuring diversity within his professional field and at work," Duane says. "He serves as a role model for aspiring young African American students."

Jon is an Executive Fellowship mentor and works with interns from around the country. "I take mentoring really seriously," he says. "It is our responsibility as scientists to mentor the next generation. It's close to my heart because I was groomed by mentors."

He and his wife volunteer with Big Brothers Big Sisters of Central New Mexico. And Jon is a life member of the National Society of Black Engineers and the NAACP. He is also area director of the service fraternity Alpha Phi Alpha, which had Dr. Martin Luther King Jr. as a member.

In his spare time, Jon plays video games, reads, and watches movies. He also takes on the occasional painting job around the house, a nod to the family business. "It tends to be on my to-do list," he smiles.

Jon's message to young people is the same one he received as a kid from his parents. "It doesn't matter what you choose to do, just strive to do your best," he says. "The better you perform now, the more doors will open for you later. You don't want to close those doors before you have a chance to look through them. You never know what opportunities are around the corner."

February is
Black History Month

Black History Month is celebrated annually in the United States during February to remember and celebrate the achievements of black Americans and the central role of African Americans in US history.

The story of Black History Month begins in 1915 when historian Carter G. Woodson and Minister Jesse E. Moorland founded the Association for the Study of Negro Life and History, dedicated to researching and promoting achievements by black Americans and other peoples of African descent. Now known as the Association for the Study of African American Life and History, the group sponsored a national Negro History Week in 1926, choosing the second week of February to coincide with the birthdays of Abraham Lincoln and Frederick Douglass.

Mayors across the country began issuing yearly proclamations recognizing Negro History Week. In the late 1960s, due to the Civil Rights Movement and a growing awareness of black identity, Negro History Week evolved into Black History Month. President Gerald Ford officially recognized Black History Month in 1976, calling upon the public to "seize the opportunity to honor the too-often neglected accomplishments of black Americans in every area of endeavor throughout our history."

Each American president since then has designated February as Black History Month and endorsed a theme. The 2015 theme is "A Century of Black Life, History, and Culture" to recognize African American contributions to US and world history in such areas as politics, diplomacy, music, art, and literature.